UCRL-JC-124856 Abs

National Ignition Facility Frequency Converter Development (*)

C. E. Barker, J. M. Auerbach, C. H. Adams, S. E. Bumpas, R. L. Hibbard, C. L. Lee, D. H. Roberts, J. H. Campbell, P. J. Wegner, B. M. Van Wonterghem, and J. A. Caird

University of California, Lawrence Livermore National Laboratory
P.O. Box 808, L-487, Livermore, CA 94550

[Abstract submitted to the Second Annual International Conference on Solid-State lasers for Application to Inertial Confinement Fusion, October 22 - 25, 1996, Paris, France]

In order to achieve the nearly theoretical maximum third harmonic conversion efficiency required of the National Ignition Facility (NIF) laser, the frequency converter design must account for the influence of many effects that can degrade converter performance. Within the finite dynamic range and angular acceptance of the frequency converter we must accommodate variations in irradiance and phase in the incident laser beam, bandwidth applied to the incident beam, crystal quality and surface figure, alignment tolerances, transmission of the crystal coatings, input polarization errors, and crystal temperature variations.

The error budget that we are developing for the NIF frequency converter design is based upon both theoretical analyses and experimental data accumulated on the Beamlet prototype laser system. We have analyzed the influence of gravitational sag and crystal figure on frequency converter performance. We are designing and prototyping a frequency conversion crystal mount that will allow us to minimize the performance losses due to crystal surface figure induced by gravitational sag, clamping forces, and crystal finishing operations.

* Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. W-7405-ENG-48.